Research & Development

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Our forecast for R&D funding through 1984

Materials and technology in communications

News of value to people who work in R&D

Research & Development

SERVING THE $186 BILLION WORLDWIDE R&D INDUSTRY

Multiregion scans and depth profiles in ESCA. See p 80.

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ABOUT THE COVER

We may not be operating in outer space as this unit appears to be, but we do need a good vacuum when we use ESCA (photoelectron spectrometry) techniques. Use of photoelectric effects permits chemical analysis of the top few layers of solids.

A recent *I•R 100* award winner is an improved spectrometer that features a small spot size and monochromatic x rays. The small spot size lets analysts study small features that would be damaged by electron beam analysis. See article beginning on p 80.

Cover photo courtesy Surface Science Laboratories Inc.

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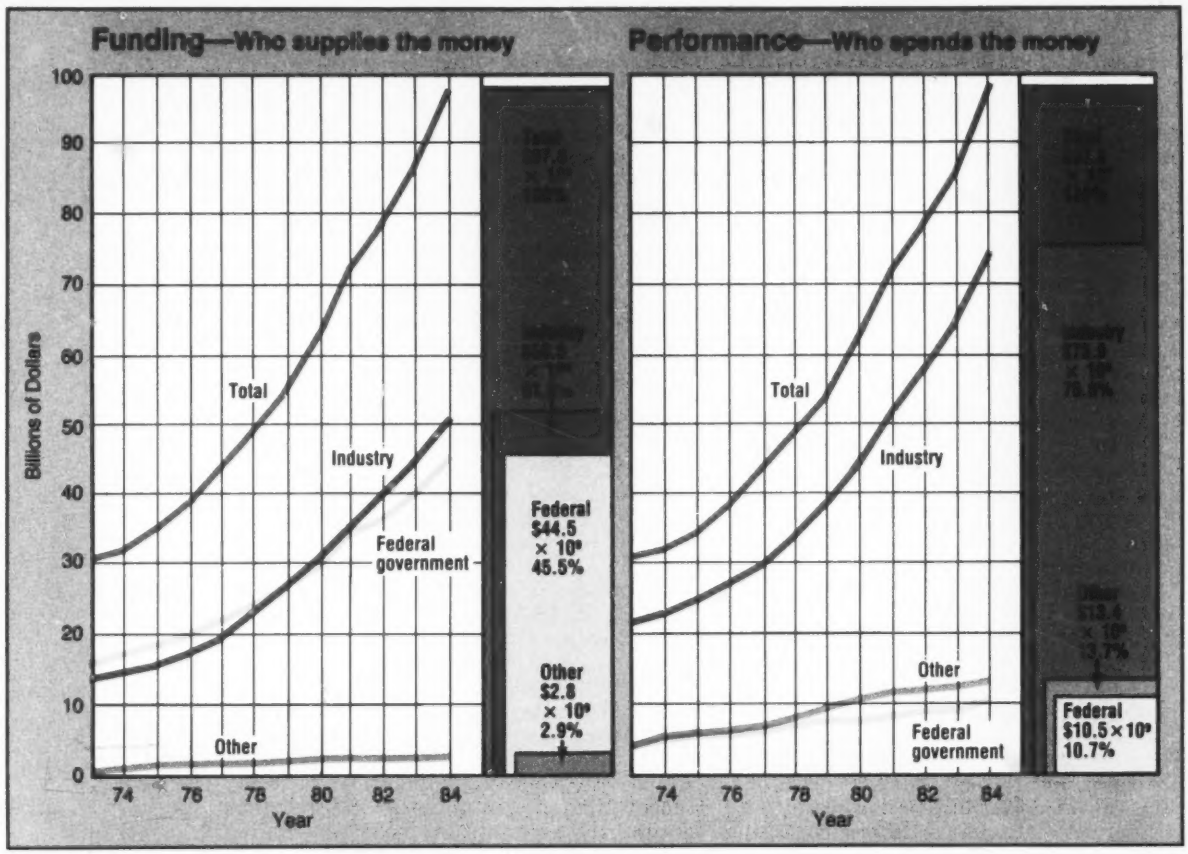

Funds for R&D will reach almost $98 billion in 1984

Our annual forecast predicts R&D spending of $97.8 billion in 1984. But part of the apparent increase stems from adjustments to earlier data and their interpretation.

C.J. Mosbacher
Executive editor

AT FIRST GLANCE, the graphs at the top of this page indicate an enormous increase in R&D funding in the United States from 1983 to 1984. Actually, you are looking at an anomaly. The funds will be available—some $97.8 billion if our forecast is right—but the increase from earlier years is smaller than the graphs would indicate.

To understand why, we have to go back several years and examine funding provided by the Federal government and by industry. The data through 1983 in the graphs come from a National Science Foundation publication, "Science Resources Studies Highlights," NSF 83-316, dated July 22, 1983. Many of the adjustments to earlier data have already been made in these latest NSF statistics on R&D funding. For example, NSF's estimate of Federal government funding for 1983 now is $39.63 billion, significantly higher than the $39.2 billion in our forecast of 1983 funds (*R&D*, January 1983).

We had expected late Congressional appropriations to keep Federal funding well below budgeted levels. Instead, Congress used a continuing resolution to replace appropriation bills for a significant portion of R&D—in effect providing more money earlier. Thus the various government departments were able to obligate funds at an earlier time than we expected, resulting in an increase in Federal funds spent in 1983.

NSF 83-316 also adjusts Federal funding data for earlier years: down from $30 to $29.7 billion in 1980; up from $32.9 to $33.8 billion in 1981; and up from $36.1 to $36.6 billion in 1982. The data for 1982

and 1983 are labeled as estimates.

More significant are the revisions to industry funding levels. In 1981, these increased from $34.4 to $35.9 billion; in 1982, the increase is from $38.0 to $40.0 billion; and in 1983, from $41.7 to $44.3 billion. But even these increases do not reflect all of the increases that are to be made. Preliminary indications are that additional corrections will be made for 1981 and succeeding years as final data from Bureau of Census surveys of industry and other sources are compiled.

The National Science Foundation was not alone in underestimating industry funding for this period. For 1980, for example, we predicted a 12.5% increase over the preceding year, and for 1981, an increase of 14.3%. The Economics Dept. of McGraw-Hill Publications Co. recently reported that R&D spending by industry increased more than 16% in each of these years. This tends to confirm the need for further revisions in the NSF data. We shall discuss this point further in a later section.

For now, as in previous forecasts, we should note that the NSF data for 1983 being used as the basis for this forecast are that industry provided $44.3 billion for R&D and spent $64.3 billion in the performance of R&D, with the difference coming from Federal funds. Federal funding was $39.6 billion; performance, $9.7 billion. Academic and other nonprofit organizations provided $2.6 billion and spent $12.5 billion, with most of the difference coming from Federal funding, although industry funding of this sector has increased.

NSF 83-316 also provides estimates of 1984 funding that total $97 billion. This includes $44.5 billion from the Federal government, which will perform $10.5 billion of R&D in its own facilities. Industry will provide $49.8 billion and spend $73.3 billion. Academic and other nonprofit organizations will provide $2.8 billion and spend $13.2 billion.

The principal difference between these NSF projections and our forecast lie in funding provided by industry for its own R&D and for projects it supports in academic and other nonprofit organizations. This will be discussed as we consider each sector in turn.

Why industry data are revised. As noted earlier, NSF and *R&D* forecast data for 1980 and 1981 underestimated industry funding. While some revisions have been made because of this, we feel that 1982 funding by industry is still understated. We therefore have increased 1982 industry funding to an estimated $41.7 billion, some 16.3% above 1981, and projected 1983 industry funding as just under $45.1 billion.

Thus, although a 14% increase over 1983 is indicated against the NSF data, an increase of just under 12% from the revised 1983 base leads to our forecast of $50.5 billion for industry funding in 1984. Similarly, industry performance of R&D will rise to $73.9 billion, almost 15% over the 1983 NSF base but less than 12% from the revised base.

Part of this projection rests on defense funding increases by the Federal government being larger than other Federal funding increases. Most of defense R&D spending goes to industry efforts. Another part of the projection tends to lower industry funds that are spent by industry: More industry funds are going to the academic sector and to nonprofit industrial research groups in such areas as semiconductor manufacturing and computer science.

Industry funding of $50.5 billion would be 51.6% of all R&D funds available in the United States in 1984. At $73.9 billion, industry would be spending 75.6% of all the available funds.

Federal funding surer for 1984. One of the pleasant surprises in the 1984 Federal budget has been significant increases in the amounts requested from Congress for basic research. These almost double the increases of the last few years and will provide at least 6% more funds for basic research in 1984.

But this pales when compared to the 28% increase in the budget for national defense R&D funding (note, however, that much of the basic research funding increase is included there). Transportation R&D gets a 22% increase in the budget; general science programs, 15%; health, 3%; and space a slight increase. But R&D devoted to natural resources and the environment are scheduled for a 15% decline; energy for an 11% decrease.

Overall the budget for fiscal 1984 called for $45.7 billion. Congress has appropriated virtually all the defense funds requested in the budget and has not significantly changed funding levels overall, although it has rearranged priorities for spending in such appropriations as that for the National Institutes of Health. We project that Federal government funding will provide $44.5 billion in 1984, or 45.5% of total funding. We also project that Federal laboratories will spend $10.5 billion, or 10.7% of the total. This amounts to a 12.4% increase in funding and a 7.2% increase in performance over 1983.

Universities and nonprofits match gain. In performance, the academic and nonprofit sectors also will experience a 7.2% gain from 1983, with $13.4 billion spent on R&D for 13.7% of the total.

Funding provided by this sector will increase slightly more—some 7.7%—to $2.8 billion. Actually, part of this apparent increase is due to rounding; a better figure would be $2.75 billion, or a 6.2% increase. This is about 2.9% of total funding.

In summary, some might consider a forecast of a 12% increase in R&D funding for 1984 optimistic, as it implies, with 5% inflation, real growth of 7%. We feel that the projections are realistic and will be reached, barring any catastrophe in the overall economy. R&D